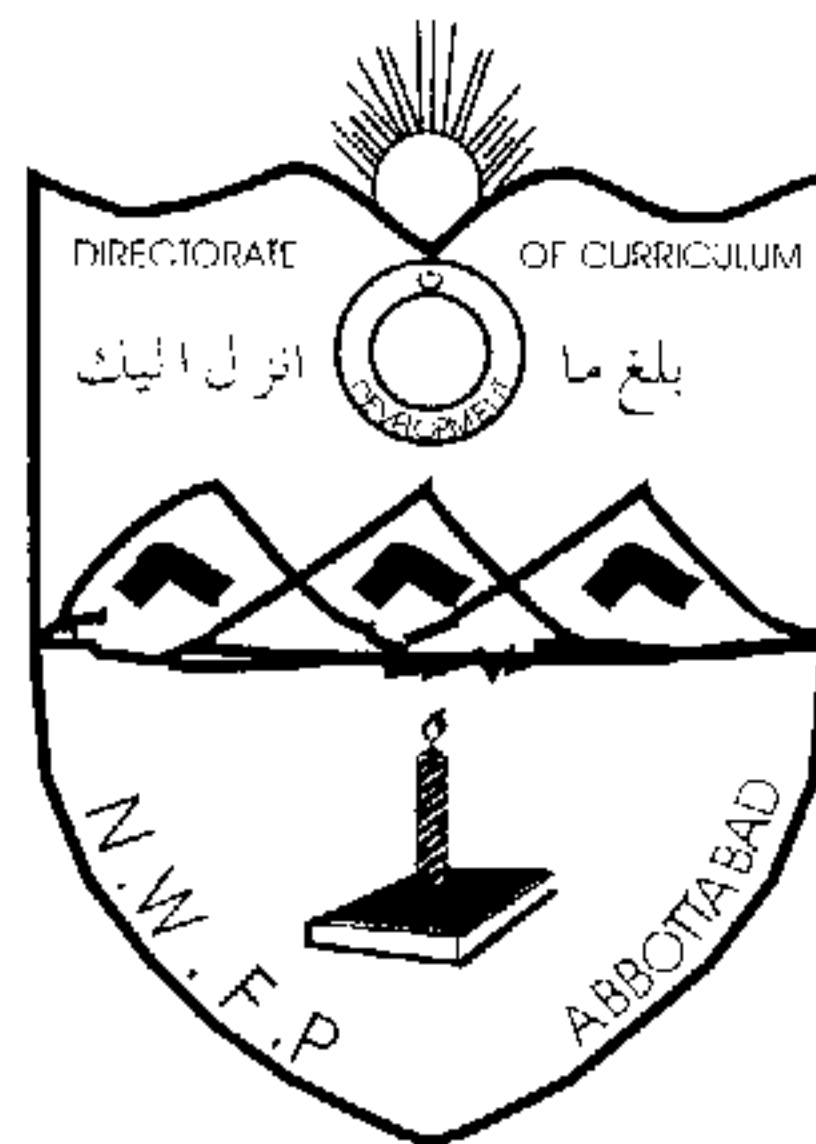
MODULE

Teaching of Biology

(Classes XI-XII)

For

Master Trainers / Teachers

(In-Service Training Programme)

DIRECTORATE OF CURRICULUM & TEACHER EDUCATION NWFP ABBOTTABAD

JANUARY, 2003

MODULE

Teaching of Biology

(Classes XI – XII)

For

<u>Master Trainers / Teachers</u>

Of

(In Service Training Programme)

DIRECTORATE OF CURRICULUM &

TEACHER EDUCATION NWFP

ABBOTTABAD

February, 2003

Title:- **Module Teaching of Biology**

For

Classes XI – XII

For

Master Trainers / Teachers

Of

In Service Training Programme.

Patron in Chief : Umar Farooq (Director)

Compilation : Shamim Sarfraz (Deputy Director)

Written by : 1. Shafqat Subject Specialist (Biology) GHSS Nawahsher.

2. M. Arif Subject Specialist (Biology) GHSS Bagra Haripur

Reviewed : Syed Waqar Shah Subject Specialist (Biology) GHSS Bagnotor Abbottabad.

Publisher : Directorate of Curriculum & Teacher Education NWFP Abbottabad.

Date of Publication : February, 2003

First Draft Typing : Muhammad Farooq, Steno

Composing : Qazi Printers Adda Gami Abbottabad .

Printing : Government Printing Press NWFP Peshawar.

FOREWORD

Directorate of Curriculum & Teacher Education, NWFP, Abbottabad is launching a comprehensive programme of in-service through out the province for all subjects/categories for the classes 6th to 12th under the title "Teacher Training Programme" scheme Improvement of Learning Environment For Quality Improvement for the year 2002-2004 as per policy of the Govt of NWFP, School & Literacy Department, Peshawar. The prime focus of this manual is training delivery effectively. There are two approaches to teacher's professional development, the carporate approach and the individual one, but in this guide book attempts are made to link the both practically.

To make the INSET Programme more effective and successful a "Survey Study" has been conducted to collect the feed back, needs of the learners, requirements of the teaching staff and desires of the concerned managers through, interview/questionnaires, survey form and classroom observation forms. Sample for the study was selected a few middle and secondary/Higher Secondary schools (Girls boys urban & rural).

The study was conducted by the Deputy Director (Training) and Subject Specialists of this Directorate.

In the light of above information & facts training strategy and instructional material has been developed to improve the learning environment for quality improvement through the innovative methodology and pedagogical techniques.

Instructional material consists on training manual for lead trainers & field trainers for delivery of training effectively and modules for each subject (VI – XII/Science/Arts) to facilitate the field Trainers as well as trainees of all categories (SS, SET (Science/Arts), CT, AT, TT).

The training manual comprises two parts, one for Subject Specialists training imparted by PITE and the other one for SET/CT/AT/TT training imparted by RITEs NWFP.

Umar Farooq
Director
Curriculum & Teacher Education
NWFP, Abbottabad

INTRODUCTION:

The drama of the modern insight into the nature of the living world has not only brought Biology to the front of scientific advance but has also aroused fresh public interest. These conditions have produced an exciting challenge for the teacher because he has to meet the nation's call for future science specialists in Biologically – related industries and callings. without whom the technological and scientific agricultural activities would not survive. There needs most often have to be met in mixed ability groupings. The question is that what should be done when biology teacher encounters a class of all kinds of students. Here is a basic clue on how to cope not merely with variation in academic ability, but with variation in all capacities. The conclusion is that as for as possible every child needs to be occupied with what he can do best. to translate this into action and workable scheme is difficult but not impossible.

It is now desirable to look more at individual differences. Keeping into view demand of individual variations in students the module was developed as to make teachers aware. to prepare flexible lesson plans which can be attired on the spot. and which include alternatives which may go better than others or suit some individual best. Module will enable the teacher to be absolutely realist and relevant to the children lives, at least when starting a topic.

In a "Let's" find out together approach a teacher who is not an expert in a given line can do excellent work, which will be enhanced by knowing who to guide work towards asking the right questions. Contents of the module indicate that what is relevant to child life may be followed.

OBJECTIVES

1. Understand the importance of Biology understand basic concepts and facts of Biology. Apply knowledge to the solution of new problems.

2. Develop confidence in pupil to study the nature independent by.

   (i) Faster the ability to draw conclusion.

   (ii) Faster pupils skill in observation and demonstrations.

3. Enable the student to think and act as a productive member of the society.

1.	**Subject**	**:**	**Biology**
2.	**Class**	**:**	**F.Sc**
3.	**Topic**	**:**	**interesting Botany**
4.	**Objectives:**		**The Students will be able to**

i. Use observation, touching and smelling senses in the studying the barks of various trees.

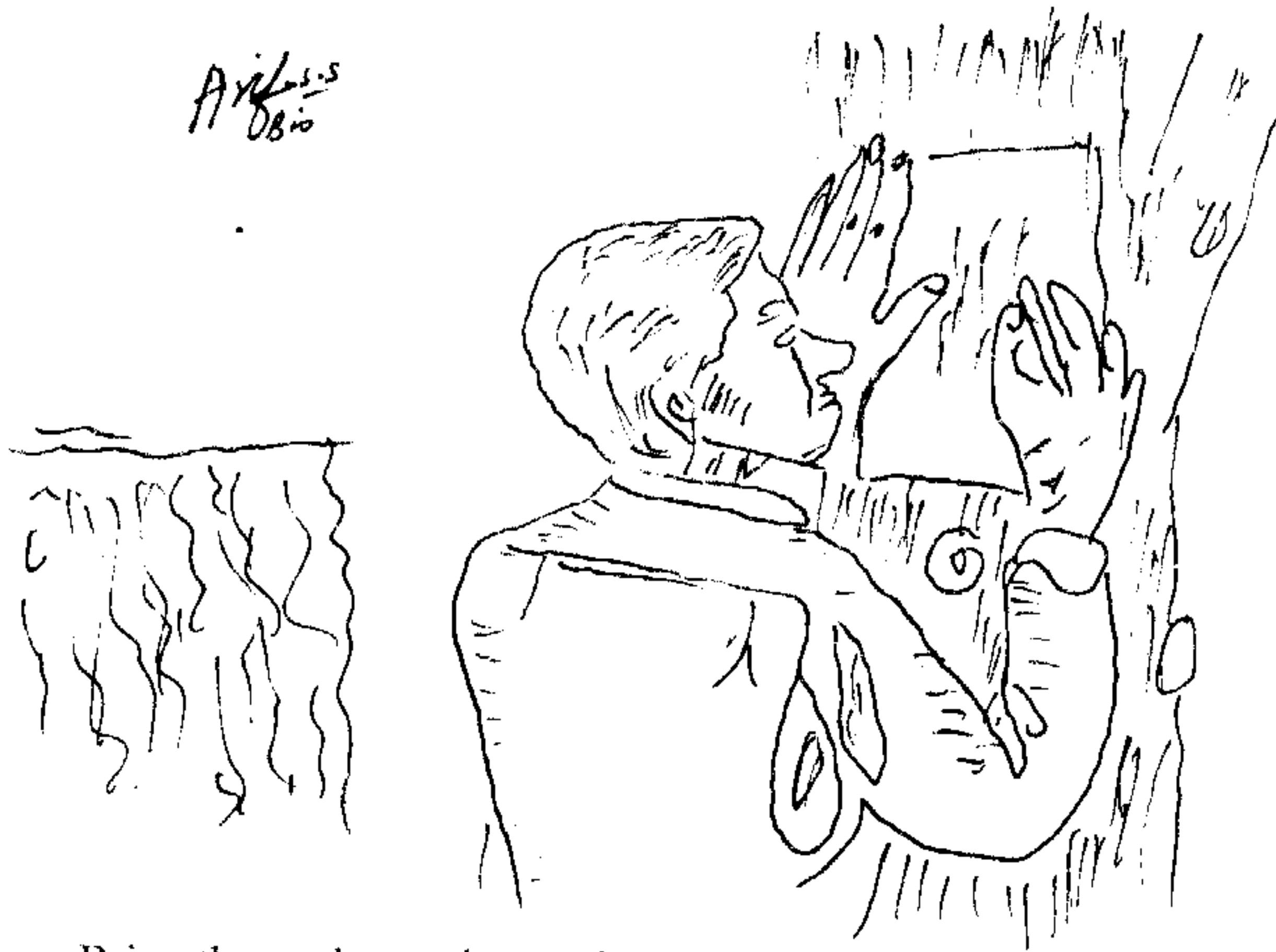
5. **Material Required:** White paper, Waxy Colors, Available trees in the lawn.
6. **Introduction:** It is very dull to say that our observation, touching and smelling senses are not properly utilized in botanical / biological studies this result to promote a passive mode of learning which is depending upon rote memorization.

   If we use our these senses we can bitterly understand and develop an attitude for science learning skills.

   This lesson is consisting of only one activity which is very simple, short and interesting.

7. **Activity No.1**

Individual Works

time 35 Minutes

- Bring the student to lawn where trees are abundant.
- Give each student different tree ask him to study its bark by three senses (Don't need to know the names of trees).
- Then ask each students to place a plane paper sheet on the bark of concerned tree with one hand and run the waxy pencil on the papers with the other hand.
- Student can see the different patterns of barks on the papers.
- Then compare the tree samples and note down the differences.
- Write downs the names of trees by seeing smelling touching the trees and their patterns of barks on the paper.

Q.1 Ask the students do you like this activity. Why?

* Write their comment on the black board in key points.

Q.2 What is the importance of this activity? Can we make simple activity like this please design simple activities in your groups.

* Supervise, Help them to design their activities.
* Presentation.

Biology

Level: S.S level

Topic: **"Harmful and beneficial Bacteria, and prevention / Preservation (methods) of food stuff."**

OBJECTIVES / AIMS:

After the lesson the learners will be able :

1. To tell the harmful and beneficial effects of Bacteria.
2. To explain the Preservation / Prevention of different food stuffs.

SUPPORT MATERIALS:

Spoiled food stuffs like bread, vegetable; charts, pencil, markers, erasers, milk pack, toffees, jame, jellies, etc.

TEACHING / LEARNING STRATEGIES:

1. Arrange the above mentioned materials
2. Make sheets of questioners. (Or Question sheet # 1) according to your groups needs, as shown on pages 3 and 4.
3. Make chart (Chart # 1) of "Harmful Bacteria", as shown on page 4.
4. Make chart (Chart # 2) of "Diseases Caused by Bacteria" as shown on page 5.
5. Make chart (Chart # 3) of "Beneficial Bacteria" as shown on page 6.
6. Make Question sheet # 2(or work-sheet # 2) as shown on page 9, according to your groups need.
7. Make a table (Table # 1) of Food Preservation Methods" as shown on page 8.

8. Make work-sheets for Evaluation according to the number of students / groups.

"INITIATION OR BRAIN-STORING ACTIVITY".

GROUP FORMATION :

1. Make appropriate groups, according to the size of participants.
2. Ask the following three questions from the participants, by writing these on the black-board conspicuously:

Question # 1. What are bacteria?

Question # 2. How bacteria affect human life?

Question # 3. What are prokaryotes?

3. After some pause ask from one group the answer of Question # 1 through their respective leader; If they answer that Bacteria are microscopic organisms, single-celled structure, spherical, cylindrical, comma-shaped and spiral-shaped. Then O.K otherwise tell them these.

4. Then ask the second Question from another group, and ask them to answer through their respective leader. If they answer that bacteria affect human being both beneficially and harmfully, then O.K otherwise clear these precisely

5. Then ask third question from third group, and if their leader Answer that prokaryotes are these organisms whose nuclear material is without nuclear membrane like Bacteria and Blue-Green Algae, then O.K otherwise clear them this point.

6. Then tell them that Bacteria are found everywhere; and inter-relationship between these micro-organisms and human-being is both a harmful one. as some cause diseases and destroys human food-stuffs. etc. and can also be a beneficial one as some produce useful products for humans.

7. Now with the help of participants paste the Charts. chart # 1. chart # 2 and chart # 3. on conspicuous places of the class.

8. After that provide each group some rotten samples of bread. fruits. vegetable. meat, milk. etc. and ask them to ponder over these spoilage.

9. Then provide each group the sheets of questionnaires (or Question sheet # 1) for solving by using the charts(# 1. # 2 and # 3) as has just pasted on the walls of class-room, and ask them to note the answers.

"QUESTIONNAIRE / QUESTION-SHEET # 1 / OR WORK-SHEET # 1"

Q.1: How food-stuffs are spoiled?

Q.2: What type of loss do these micro-organisms to the food?

Q.3: Name some of the diseases caused by bacteria?

Q.4: What is the cause of food-Poisoning?

Q.5: How bacteria help in increasing the soil fertility?

Q.6: Can bacteria synthesis antibiotics?

Q.7: How bacteria help in backing industries?

Q.8: How bacteria help in industrial processes?

Q.9: How bacteria help in quick recycling of nutrients in the ecosystem?

Q.10: How timber and textile is destroyed by bacteria?

CHART: 1
"HARMFUL BACKTERIA"

Some bacteria are harmful to humans, such as:

1. Soil denitrifying bacteria reduce nitrogen content of Soil.
2. Rot occurs in timber and textile material due to bacteria action.
3. Food poisoning occurs due to action of Salmonella. staphylococcus and Clostridium bacteria present in faeces, septic skin infection, and soil contaminating fresh and cooked foods.
4. Similarly pathogenic bacteria cause diseases in plants and animals by producing poisonous toxins.

Chart # 2

"Diseases caused by bacteria"

The following are some main bacterial diseases in man.

I. Cholera:

Caused by cholera bacteria, Vibrios, through contaminated water and food. Symptoms are violent diarrhea, collapse and dehydration.

II. Tuberculosis:

Caused by a bacillus, Mycobacterium. The sources are infected humans and cows, who infect others by droplet infection, coughing, spitting, or infected milk. Symptoms are cough, blood spitting, fever, night sweating and loss of weight.

III. Gonorrhea:

Caused by Gonococcus bacteria, and is sexually transmitted disease through infected persons, most common and serious in men than in females. Symptoms are discomfort on maturating in men, and yellow discharge, fever and headache.

* Other diseases caused by bacteria are:

Diphtheria, tetanus, Leprosy, Typhoid fever,
Meningitis, Sore throat, Whooping Cough, etc

Chart # 3.

Beneficial Bacteria

Some bacteria are beneficial to humans, such as:

1. Nitrogen-fixing and nitrifying bacteria in soil increase the soil nitrogen content.
2. Gut bacteria produce vitamins of the B-group and the enzyme, cellulase content.
3. Antibiotic synthesis of streptomycin, tetracycline, and neomycin is by soil bacteria, bacilli and streptomycinces species.
4. Food fermentation occurs in cheese, butter, yoghourt and agricultural silage.
5. Sewage breakdown is due to bacteria acting as decomposers.
6. Industrial processes, tobacco curing, vinegar manufacture, butter, cheese, linen and leather making involve bacteria action stages.
7. Most decomposers are bacteria, hence they help in rapid recycling o fnutrients in ecosystem.
8. Now paste the Table # 1, as shown in next page, inform of class.
9. Then provide each group some samples of milk-pack jame, preserved juices, toffees, cooked vegetables and meat, food preserved in refrigerators, dried milk, fruits and vegetable.
10. Then tell the participants that food-stuffs are preserved/stored by various methods, by using table 1. The basic principles of these method is to kill the microorganisms or make the environment unfavorable for its growth.

Different methods are used for this purpose as shown in table # 1. Such as

i. High Temperature
ii. Radiation
iii. Use of Chemicals
iv. Drying or dehydration
v. Storage at low temperature.

11. Then provide each group the following Questionnaire (Question Sheet # 2) and ask them to find-out the answers of these questions by using this Table # 1: and after completion each group will have to present its answers through its respective group leader.

“ QUESTION # 2.” OR “ QUESTION-SHEET # 2.”

Q.1: How can we preserve/store foodstuffs?

Q.2: What principles are used for food preservation?

Q.3: Name various methods of preservation?

Step 14

After completion of this & each group's presentation present SUMMARY, the following summary, before the class"

Bacteria are microscopic organisms of prokaryotic group; from human's point of view they are both harmful and beneficial, as they destroy/damage human's food stuff and other valuable properties, and also cause some dangerous and deadly diseases. At the same time bacteria are beneficial to humans as their products are useful for man. There are various ways for preservation / preventing of food-stuffs from this spoilage of microorganisms by employing high temperature, radiation, chemical, dehydration and storing at low temperature.

WORKSHEET FOR EVALUATION

Q.1: Which one of the following methods is more effective for milk preservation.

a). Radiation, b). Biology, c). pasteurivation d).Chemical /Methods

Q.2: Meats, fruits vegetables and fish are preserved best by :

a). chemical , b). sterilization , c) Low temperature, d) dehydration.

Q.3: we can enhance the heat penetration properties of food-stuffs by:

a). Chemicals, b). Dehydration, c). Steam under pressure, d) Biology.

Q.4: Tuberculosis is caused by ____________________.

a). HIV, Tape-worm c). Vibrios d). Mycobacterium.

Q.5: How the food-stuffs are contaminate:

Ans:______________________

____

____

Q.6: Cholera is caused by ______________

Q.7: for james and Syrups ___________ preservation are used.

Q.8: What are the causes of food spoilage?

Ans:______________________

____

____

Q.9: What are the methods of food preservation?

Ans:______________________

____

____

Q.10: Dehydration removes __________from food, preventing pathogenic growth.

BIOLOGY

LEVEL : S.S /SET

TOPIC: "classification / Taxonomy of Animal kingdom"

Aims / Objectives: To enable the learners for :

1. Recognition of different Groups/phyla of Animals;
2. Development of a sense of keen observation;
3. How animals are grouped together.

Material Required:

Flash-cards, paper-sheets, Markers, pencil, Pictures/Drawings of different animals, particularly representative of each group etc.

Teaching / Learning Strategies:

1. Prepare work-sheets (from work-sheet # 1to work-sheet # 10 as annexed at the end of this lesson on pages 7,8,9,10,11,12,13,14,15,16.

2. Make /Prepare ten (10) Flash-Cards upon the names of ten (10) phyla of Animals Kingdome, viz.

i. Protozoa. ii. Porifera, iii. Coelentrata. iv. Platehylminthes, v. Nematoda, vi. Annelida vii. Mollusca, viii. Arthropoda x. Echinodermata and x. chordata; and if possible make/paste one/two pictures / diagrams of representative animals of that particular phylum on that card.

3. Make small chits/pieces of papers according to the number of participants, and write upon these the names of ten phyla if for example there are 30 participants than 3(three) chits of each phylum.

4. Make a chart (chart # 1) of this question:

Question: " Identity and write separately the names of Invertebrates and vertebrates in separate columns?"

i. Man.	ii. Butterflies	iii. Goat	iv. Elephant
v. Honey-bee	vi. Snail	vii. Snake	viii. Jelly-fish
ix. Amoeba	x. Whale		

5. Make a chart (chart # 2) of vertebrates and Invertebrates:

Chart # 2:

Invertebrate Animals	Vertebrate Animals
i. Man	i. Amoeba
ii. Goat	ii. Jelly-Fish
iii. Elephant	iii. Snail
iv. Snake	iv. Butter flies
v. Whale	v. Honey-bees

6. Make a chart (chart # 3) of the names of phyla of Animals kingdom as:

The Animal Kingdom is divided into following ten (10) Phyla :

1. Phylum Protozoa
2. Phylum Porifera
3. Phylum Coelentrata
4. Phylum Platehlminthes
5. Phylum Nemadota
6. Phylum Annelida
7. Phylum Mollusca
8. Phylum Arthropoda
9. Phylum Echinodermata
10. Phylum Chordata / vertebrata

Initiation / Brain-storming

Group-Formation:

1. Distribute the chits / pieces of papers, upon which the names of phyla are written randomly, and then ask them to see which group they now belong, and then place flash-cards of 10 phyla before each group.

2. Then show paste chart # 1 with the question Q. Identify and write separately the names of invertebrates and vertebrates in separate columns from the given list?

3. After some pause ask a few about the answer and then show / paste chart # 2, and by using this chart tell them that man, goat, elephant, snake and whale belong to the group vertebrata as all these posses some common characteristics such as notochord and vertebral column. While Amoeba, Jelly-Fish, snail, Butterfly and honey-bees belong to group invertebrate.

4. Then tell them that animals are living organisms without chloroplasts and cellulose walls. These are classified and grouped together into phyla according to their similarity and nearkinship. The Animal Kingdom is classified into ten (10) large phyla (singular: Phylum) ranging from phylum: protozoa to Phylum: Chordata. Each phylum is composed of animals that share a few basic characters which are heritable and can be passed on to offsprings of the same kind.

5. Then paste chart # 3, and tell the participants that Animal Kingdom is divided or classified into these ten (10) phyla, name each phylum one by one by pointing at the chart.

6. Then distribute related Work-sheets to the groups as Work-sheet # 1 of protozoa must be given to the protozoa Group and so on. Ask each group to read the pages of yours concerned phylum and complete the work-sheets. Also direct them to discuss in group and write down the characteristics and examples of your group's phylum.

7. Then after some time ask group leaders of each group to present their group work one by one, starting from phylum : protozoa to phylum : Chordata / vertebrata.

8. After the completion of this activity present before the participants the following summary:

Animals are living-organisms without chloroplasts and cellulose walls. They are classified and grouped together according to some basic characters which are heritable and can be passed on to offsprings of the same kind.

The basic unit of classification is species and similar species are grouped together into genus, and then family, order, class, phylum and Kingdom follows the hierarchy.

There are ten (10) phyla of Animals Kingdom, viz. (make use of chart # 3):

1. Phylum Protozoa
2. Phylum Porifera
3. Phylum Coelentrata
4. Phylum Platehlminthes
5. Phylum Nemadota
6. Phylum Annelida
7. Phylum Mollusca
8. Phylum Arthropoda
9. Phylum Echinodermata
10. Phylum Chordata / vertebrata

EVALUATION

Q.1: Amoeba is the member of phylum ________________________

a). Porifera. b). Echinodermata. c). Mollusca d). Protozoa

Q.2: Butterflies are members of group ________________________

a). Invertebrate. b). Vertebrata. c). Mollusca. d). Protozoa

Q.3: Write down the names of two members of phylum : Arthropoda.

a.________________ b.____________________

Q.4: Identify the Phyla of following animals:

Name of Animals Phylum

1. Jelly-fish.
2. Star-fish
3. Silver-fish
4. Dog-fish
5. Liver-fluke
6. Bird.

Q.5: Write down three(3) characters of Phylum:

Chordata / Vertebrata:

a.____________________

b.____________________

c.____________________

Note Please: If any of your answer is not correct, for correction read the following pages for each question:

For Q.1:	P.92.	for Q.2:	P-99	For Q.3:	P-99
For Q.4:	P-94,95,99 and 101.			For Q.5:	P-101

Work-Sheet: # 1.

Phylum: Protozoa

Q.1: Please write down four characteristics of Phylum Protozoa.

Ans: 1.
2.
3.
4.

Q.2: Please write down the names of parasitic and free-living members of Phylum Protozoa.

Ans:

FREE-LIVING PROTOZOA:	"PARASITIC PROTOZOA"
______________	______________
______________	______________
______________	______________
______________	______________

Q.3: Some Pathogenic or Disease causing Protozoa are

Ans: ______________

____

____

Q.4: Please Draw and label Amoeba-~~&~~and-Paramecium

Amoeba: Paramecium

Work-sheet: # 2.

Phylum: Porifera

Q.1: Please write down three characteristics of Phylum: Porifera:

i.

ii.

ii.

Q.2: The members of Phylum Porifera dewels in:

(Please tick the correct one)

i.	In Oceans / Sea (Saltish Water)	ii.	On land
iii.	In Fresh Water	iv.	In Air

Q.3: Why the name Porifera is given to Phylum : Porifera

Q.4: Phylum Porifera's body/structure is made up of ________________________.

(Please fill in the blank space with appropriate answer).

Work-sheet # 3.

Phylum "Coelentrata"

Q.1: Please write down any three characteristics of Phylum Coelentrata:

Ans: 1.

2.

3.

Q.2: How many layers take part in the formation of Coelentrates:

Q.3: Please define mesoglea?

Q.4: The members of this Phylum dwells in how many habitats:

1.

2.

3.

Q.5: Please write down the names of few members of phylum : Coelentrata.

Work-sheet. # 4.

Phylum: " Platehylminthes"

Q.1: Please write down any three characteristics of Phylum : Platehylminthes.

Ans: 1.

2.

3.

Q.2: Please write down the names of few members of Phylum : Platehyminthes.

Ans: 1. 4.

2. 5.

3. 6.

Q.3: Please write down the names of some parasitic and some free-living members of Phylum: Platehylminthes:

Parasitic Free-living

Work-sheet # 5.

Phylum : "Nematoda"

Q.1: Please write down atleast three characteristics of phylum : Nematoda

Ans: 1.

2.

3.

Q.2: Please write down the names of some representatives of Phylum : Nematoda?

Ans:

Q.3: Why the name Round Worms has been given to Phylum Nematoda?

Q.4: Ascaris is found in ______________________________.

Work-sheet No.6
"Phylum Annelida"

Q.1: Please write down at least three characteristics of Phylum Annelida.

Ans: 1.

2.

3.

Q.2: How many Body layers take part in the formation of body of Annelida?

Ans:

Q.3: Please name the habitates of the members of Phylum : Annelida?

Q.4: Please write down the names of three members of Phylum : Annelida?

Q.5: In Earhtworm male and female sex organs are found in ________________.

i. Only in one animal 2. Separately in male and female individuals.

Work-sheet # 7
" Phylum : Mollusca"

Q.1: Please write down at least three characteristics of Phylum Mollusca?

Ans: 1.

2.

3.

Q.2: Shells of Phylum : Mollusca is made up of ____________________

Q.3: Please tell at least five (5) members of Phylum Mollusca: __________ __________

Q.4: The Locomatory-organ in Mollusca is ____________________

Work-sheet # 8.

"Phylum : Arthropoda"

Q.1: Please write down some characteristics of Phylum : Arthropoda.

Q.2: The members of Phylum : arthropada about __________ % all the animals.

Q.3: The members of Phylum Arthropod go through various stages of development and this process is known as---

Q4. the body of the member of phylum Arthropod a is divide into ---------------------- parts ,namely ----------------------------- and --

Worksheet #9

Phylam Echinodermata

Q1. Please write down some characteristics of phylum: Echinodermata?

Q2. Please write down the name of some marine members of phylum Echinoermata?

Q3. Is star-fish a member of pisces (fish)

Q4. Which organ is being used for locomotion by most member of phylum wchinodermata.

Q5. why is the name echinodermata given to the member of phylum Echinodermata.

Work sheet #10

PHYLUM : CHORDATA /VERTEBRATA

Q1. please wrote down the names of classes of vertebrata (sub-phylum)

Q2. please write down the names of three kinds of pisces (fish)?

Q3. writ down the names of classes of these animals?

	Animals	class-name		Animal	class-name
i.	Salamander		ii.	Toad	
iii.	Frog		iv.	Newts	

Q4. Please write down some characteristics of warm-blooded (Homoeothermic) Animals?

TOPIC : **FAMILY SOLONACEAE**

i) Know the general characters, Root.

ii) Apply the botanica0l terms for floral parts.

iii) Write floral parts.

iv) Discuss and elicit the economic importance of the family with examples given in worksheet.

5) **MATERIAL NEEDED** Worksheets No. 1.2.3. handlense. Needle. Scalpels flowers of potato, Tomato, mako. petunia or any one may available on the present season of the same family.

6) **INTRODUCTION** :it is our national trend about teaching of higher secondary classes with only a passive and out dated teaching method (lecture method) with is autocratic mode of present system of learning and teaching . here we stress only one way traffic and teacher dominates.

While we are discussing about activity based teaching or instruction our main focus hold be a student whose participation is about 75% compulsory while teaching role is 25% on this concern which reflects about as a facilitator, helper and initiator.

Keeping in view latest teaching active methodology we are trying to convey our message clearly Confusish and effectively this is an innovative approach in our inter level teaching aborting the condusish saying, " when listen I forget. When I see I remember. and when I do I learn "

In this lesson we include worksheets integrated with group work, pair work to involve all the students to check the validity of activity based methods an gradual removal of lecture method .

7) **GROUND KNOWLEDGE** :-Family Solonaceae (The potato family)

7.1: DISTRIBUTION : Solonaceae or the potato family is the one of the best known containing about 85 genera and 2200 species of wide geographical distribution in temperate regions and very abundant in tropical countries.

7.2 **FAMILIAR PLANTS:-** Potato(Solanum Tuberosum) Tomato (lycopersicum esculentum) Red pepper (Capsicum frutescent). Tobacco (Nicotiana tabacum), lady of night (Cesteum nocternum)

7.3 **VEGETATIVE CHARACTERS** :-

A) HABIT:-

This plants are usually herbs or climbing vines in temprate zones but in the tropics many shrubby forms are found and a few small trees (solanum verbascfolia) the production of under ground tubers. Such those of the potatoes is exceptional.

7.3 B) ROOT :

tap and branched.

7.3 C) STEM:

Herbaceous. Erect. Branched Hairy or Prickly, Underground in potato forming tubers.

7.3 D) **LEAF:**

Alternate on the vegetative parts and opposite in floral region. simple but much divided. Exstipulate.

8. **ACTIVITY NO.1** **Pair Work**

Time: 15Minutes

- Ask the students to make pairs.

- Instruct the student that we have background knowledge about the family on page no.2. please read this and answers the following questions after discussing in pairs.

- Supervise, Guide & Help if needed. while they work in pairs the question will be written on black board at the start of opening of their pages.

i) How many genera and species are included in the family solonaceae?

ii) What is geographical distribution of the family solonceae?

iii) Tell the botanical names of Potato, Tomato, Red pepper & Tobacco.

iv) Tell the name of a tree of this family?

v) Write some characters of stem that you have studied in the background knowledge?

- Elicit and then conclude the whole characters by asking the following questions on the black board.

- Ask to tell the objectives of this activity

---

9. **Activity No.2.** Group Work

Time: 20 Minutes

- Ask then to open the text book on page No________& read it thoroughly.
- Make appropriate groups of the students.

- Ask them to study the worksheet in the light of text book contents.
- Also provide only one of the original flowers of family solonceae.(Solanum nigrum). Pentunia Elba. Tomato. Potato. Lady of night or Tobacco by cutting longitudinally, vertically and note down the observation as under.

  Elicito their results as under.

Name of flower	Name of post	Color	Free or united

PART-II

Pair Work

Time:15 Minutes

10. **Activity No.3.**

- Divide the student in suitable groups.
- Distribute the worksheet among the groups.
- Instruct them to study these given information thoroughly.
- Ask them to discuss in groups.
- Join each group to make sure that each member of the group is participating and taking interest.
- Guide them if needed.
- After finishing the assigned work in time ask them for presentation one by one group leader.
- Ask the questions after each presentation for clarification of the concept for all students.
- Summarize the concept of the worksheet.

i) ┼ = zygomorphic (when Flower can only be divided into two equal halves once).

ii) ⊕ = Actinomorphic (when Flower can be divided into many equal halves.

iii) ♂ = Male Reproductive parts only present (stamens)

iv) ♀ = Female Reproductive part only present (Ovary)

v) ⚥ = Hermaphrodite (bisexual) when stamens and ovary both present in the same flower

vi) K(n) = When calyx parts (Sepals fused) Gamosepalous

vii) Kn = When calyx parts (Sepals fee) Polsepalous.

viii) C(n) = When corolla parts petals fused Gamopetalous.

ix) Cn = when corolla parts petals free Polypetalous.

x) An = When Stamens Free

xi) A(n) = When stamens fused

xii) $\widehat{C.A}$ = When petals and stamens patulous fused

xiii) G.1.3 = When ovary is monocarpellary. Bicarpellary. Tricarpillary (Apocarpous).

xiv) G(n) = Polycarpallery. Syncarpous. (Fuesd).

xv) $G\underline{n}$ = Ovary superior (Hypogynous) , fused

xvi) $G\bar{n}$ = Ovary inferior (Epigynous) free

Work sheet No.2

- Distribute the worksheet No.2, among the groups.
- Ask them to study the worksheet and discuss in groups.
- Instruct them to change the given characters in their respective symbols or terms.

The following characters are provided Your please change these characters in respective symbols and Write down the floral formulae patter of symbol is give in example firs.

Example.1

⊕ , ⚥, K , C , A , G

Zygomorphic. staminate. calyx. 5sepls. corolla. five petls. gamaopatalous. androecium. nil. gynamicum. bicarpellary syncarpous, superior.

Floral Formula____________________________________

(i) Actinomorphic. hermaphrodite(Bisexual). Calyx 4sepals. polysepalous. corolla 4petals. polypetalous. androecium 4stamens free. gynecium polycarpellary apocarpous. superior.

Floral Formula:____________________________________

(ii) Actinomorphic. Hermophridite. calyx 6 sepals gamosepalous. corolla 6 petals polyperalous. androecium 6 stamens. free. Gynecium polycarpous. inferior.

(iii) Read the symbols and write in the form of terms for Given formula.

____

Terms.____

- Supervise. Guide & facilitate if needed
- After completing the worksheet ask the following question for clarification & understanding of all the students.

Q.1. What is the importance of floral formula.?

Q.2. Why do we use various terms in Botany?

11. Activity No.4. **Group work**

Time: 10 Minutes

- Divide the student in suitable groups
- Distribute the worksheet among the groups
- Instruct them to study these given information thoroughly.
- Ask them to discuss in groups.
- Join each group to make sure that each member of the group is participating and taking interest.
- Guide them if needed.
- After finishing the assigned work in time ask them for presentation one by one group leader.
- Ask the questions after each presentation for clarification of the concept for all students.
- Summarize the concept of the worksheet.

Worksheet No.3.

- You are provided the names of some plants of the family solonaceae
- Please put these plants in respective importance given in worksheet.
- Atropa belladonna. Lalmirchi (Capsicum annum),tobacco (Nicotiana tabacum). Tomato(Lycopersicm esulentum), potato (Solanum tuberosum). Baingan (solanum melongena). Mako (Solanum nigrum). petania (petunia elba).

(i) Drug yielding /poisonous plant e.g Atropa Belladonna --

(ii) Ornametal Plants ___________________

____

____

(iii) Food Yielding plants___________________

____

____

____

Summary of the Activity No.4 will be elicited by the teacher.

____

Summary of the whole activities: Time: 5Minutes

1) Plants of this family are mostly herbs. Stem is herbaceous. flower pentamerous, bisexual, regular, hypogynous. calyx. corolla fused. stamens epipetalous, some times syngensious. pistil bicarpellary. syncarpous, axile placentation, fruit a capsule or berry.

12. Evaluation:-

Individual Work

Time: 5 Minutes

- Ask the following question from the students.

i. Bisexual flower is also called__________ A) Staminate. B) Hermaphrodite

ii. Define Pentamerous flower.

iii. What is difference between Gamopetalous & Polypetalous coralla.

iv. What do you mean by Epipetalous androecium.

v. Tell the names of five members of family solonaceae.

Ans: (i) Hermophrodite ii). When the flower has floral parts multiple of 5.

(ii) When petals are united called Gamopetalous & when petals are free called polypetalous. (iv) When stamen united with petals.

(v) Potato, Tomato, Bringil, Mako, Lady of night.

1) **Subject** : **Biology**

2) **Class** : **F.Sc**

3) **Topic** : **Food Web**

4) **Objectives** : **The students will be able to**

i) Know the meaning of food web.

ii) Presentation of linkage between different living and noo-living components.

iii) Importance of different components in Eco-system.

5) **Material Needed:** Chart paper or Paper chits. scissors. 250 m long thread ball.

6) **Introduction:** We think that organisms in an Eco-system are just lying idle, performing no function. On the other hand, they are always doing some thing i.e. interacting with each other as well as with the non-living environment. Plants and Animals associate temporarily or permanently with organism belonging to different species. The association result in developing intricate interaction amongst be harmful to one and beneficial to other or both. The transfer of food energy from the source in plants through a series of organisms with repeated stages of eating and being eaten is known Food Chain. It is in turn is consumed by and provides energy for that following it.

Every components in food web is essential for a balance in Eco-system. So every organism or non living components are interlinked. while removing singly or many of them. If the eco system is disturbed this will reflect negative impacts on organisms.

7. **Activity No.1** Brain storming

- Ask the students to makes four groups
- One group write the names of animals (Invertebrates & Vertebrates)
- The second group should write the names of plants. their parts. any other material things.
- The third group write the names of non-living things found on or above the earth.
- Supervise. Guide and help if needed while they works in groups.
- Then son up by the following sentence after their group work presentation that our earth has some living and non-living components which interact each other and this link is called food web.
- Ask to tell the objectives of this activity and write on the black board in key points.

8. **Activity No.2** Time: 20Minutes

- Instruct the students to sit in a circle.
- Distribute cards / charts as per lists attached. the size of cards may be 5 x 8 cm written various names of organisms / non living things.
- These cards should include four essential natural components i.e sun. earth. air and water.
- Take 250m long thread ball and distributes the cards / chits among the students at a time.
- Give thread ball firstly to sun's (chit holder) student. It is good to start our game from the sun because life in only possible due to the sun.
- The first student sun wraps thread on his finger and then throws to other students which presents other natural elements e.g. he give it to tree because sun provides energy to plants (Tree).
- The tree will also wrap the thread and will give it to fruit to which he feels links.

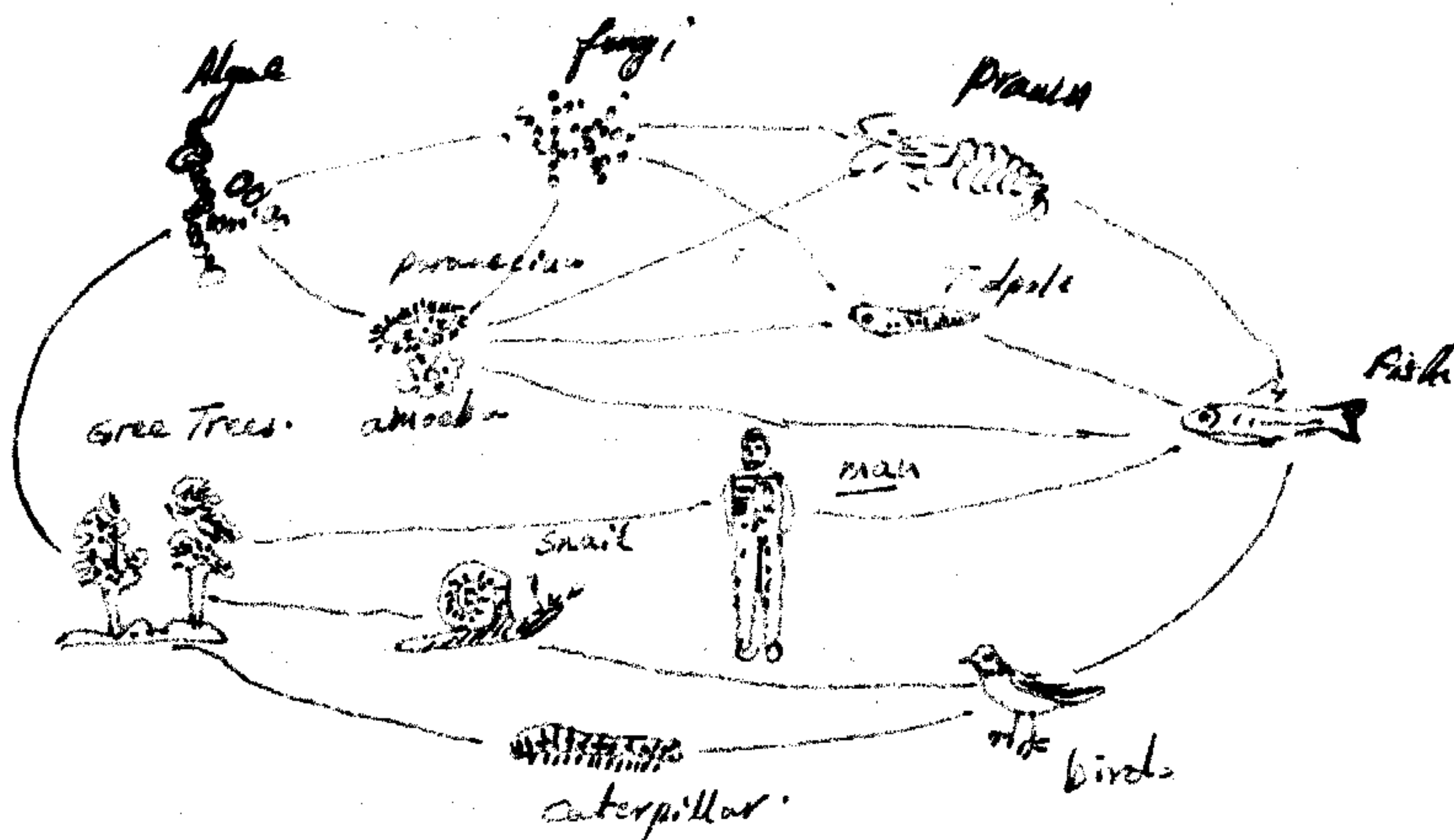
- In the same way the thread will be expended to all the students which are presents as elements of earth.
- This will make a network and the whole thread ball will be winded.
- After that instruct the students to raise their finger upto their chest level with thread.
- Then ask the student if we remove some components like Algae, Tree, Soil, etc.(Leave the thread who present different components and ask what will be happen to net at last teacher will elicit and conclude that the Sun, Earth, Water and Air are the basic needs of living things for food while others are also necessary.
- Ask the student to tell the importance of each thing to which you present.
- Ask the student to tell the objectives of this activity in key points and write on black board.

Activity No.3

Individual work

Time: 5 Minutes

- Instruct the students to see the given diagram, label each components and put in the arrowheads. Write names of producers in the first row, primary consumers in the second row secondary consumers in the third row and decomposers in the fourth row.

Activity No 3

ROW I	Names of producers_______________
ROW II	Names of Primary consumers_______________
ROW III	Names of Secondary consumers_______________
ROW IV	Names of Decomposers_______________

10. **Evaluation:**

Individual work

Time: 5 Minutes

Q.1 What is the importance of SUN in our Eco-System?

Q.2 How green plants effect the Animals?

Q.3 Define FOOD WEB?

Q.4 What do you under stand by WEB in this activity?

Ans 1. Sun is the basic source of energy for all ECO-SYSTEMS.

Ans 2. Green plants provide food shelter and oxygen to animals.

Ans 3. Every Organism in the Nature is inter linked with other living or non-living components called food web.

Ans 4. In this activity Web means an internet of food obtaining by every organisms.

BIOLOGY **LEVEL F.Sc**

TOPIC : 'STRUCTURE OF DNA '(Deoxy Ribonucleic Acid)

Aims/ objectives : After the Lesson the participants will be able

1) To define the structure and chemical composition of DNA; and
2) To illustrate the structure and chemical composition of Nucleotide. the basic structural unit of DNA.

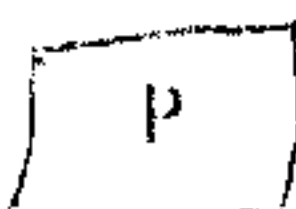
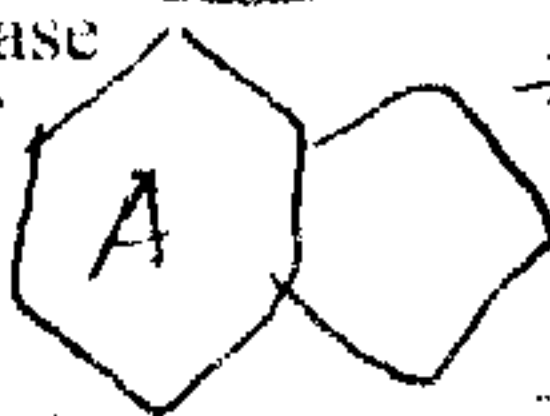
Materials Required:

Cards. charts. Coloured Ribons. pieces of wires. hard coloured-sheets (atleast of six colours). Markers. squatch-tape. etc.

Teaching-Learning Strategies:

1. Make a chart (chart # 1) of shapes of chromosomes (during metaphase stage of cell-division) as shown here:

1. Metacentric **2. Sub-metacentric Chromosome**

3 Acrocentric Chromosome **4. Telo-centric chromosome**

2. Symbolize one colouring-sheet with phosphate. the 2nd with Deoxyribose sugar. the 3rd with Adenine Nitrogenous base the 4th with cytocine nitrogenous base. and the 6th colouring sheet with thiamine Nitrogenous base.

Then cut these 6 sheets into small pieces / cutting preferably in the

Shapes of these molecules as shown below:

1. For Phosphaset (white colour sheet)
2. For Deoxyribose Sugar (Green colour sheet)
3. For Adenine Nitrogenous Base (Red colour)
4. For Guanine. Nitrogenous Base (Blue colour sheet)
5. For Cytocine Nitrogenous Base (Yellow Colour)
6. For Thiamine Nitrogenous Base (Purple Colour sheet)

3. Then arrange some of these to form four types of Nucleotides. with the help of wires. as shown below; which will be shown as model.

1.

Also make a chart of this Adenine Nucleotide. chart # 2.

Adenine Nucleotide

(Purine Nitrogenous Base)

2.

Also make a chart of this Guanine Nucleotide, chart # 3.

Guanine Nucleotide

(Purine Nitrogenous Base)

3.

Also make a chart of this Cytocine Nucleotide, chart # 4.

Cytocine Nucleotide

(Pyrimidine Nitrogenous Base)

4. Also make a chart of this thiamine Nucleotide. chart # 5.

Thiamine Nucleotide
(Pyrimidine Nitrogenous Base)

3. Then arrange some of these Nucleotides to show how these unite together to form DNA structure; especially showing that Adenine always unite with thiamine with double hydrogen bonds; and Guanine Nucleotide always with Cytocine Nucleotide with triple hydrogen bonds; and also that these unit in opposite direction i.e opposite polarization.

4. Also make a chart (chart No.6) of structure of DNA as shown here.

INITIATION / BRAIN-STORMING ACTIVITY

GROUP-FORMATION:

Step1. Divide the participants into appropriate groups, at least four Groups.

Step2. Then demonstrate the chart(# 1) of physical shapes of chromosomes, and show that during metaphase stage of cell-division chromosomes assumes these shapes, and according to these shapes, which is due to the position of Centro mere they are given the names of met centric, Submetacentric, Areocentric and Telocentric.

Step3. After that provide each group some coloured ribbons, and ask them to form these four shapes of chromosomes and demonstrate these through their respective.

Step4. After this tell the participants that these chromosomes are made up of DNA (Deoxyribonucleic acid) (about 66 percent), Proteins (about 6 per cent), and it is the DNA which is hereditary material, and which pass on from parents to

offsprings. DNA'S basic structural unit is nucleotide, and there are four types of Nuclleotides, viz. 1. Adenine. Nucleotide. 2. Guanine Nucleotide, 3. Cytocine Nucleotide, and 4. Thiamine Nucleotide.

Step5. then paste chart (charts # 2-5) and also show the moderls of four Nucleotides, and elicit one by one. Tell the participants that these are the basic structural unit of DNA, and these unite together to form structure of DNA.

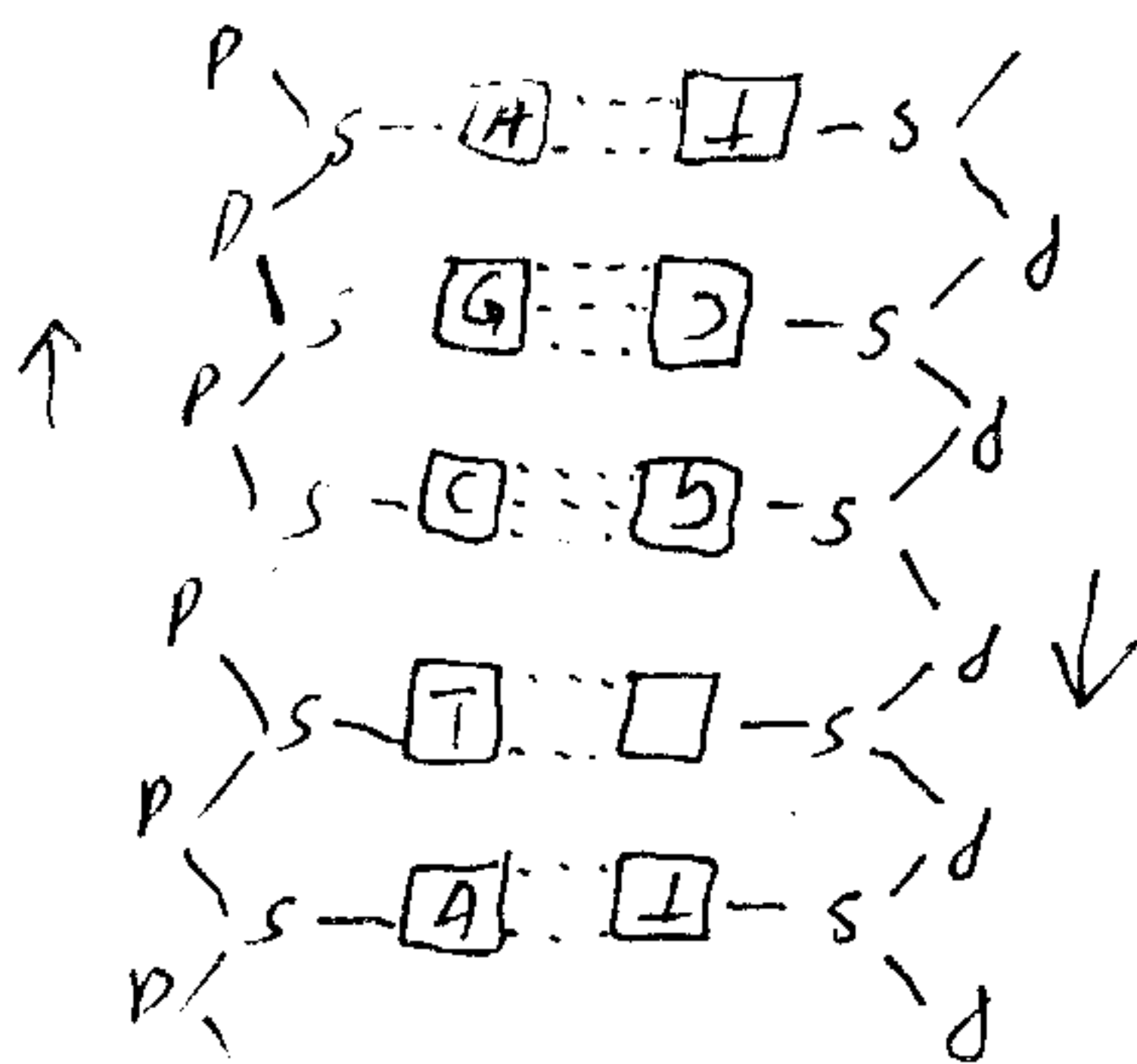
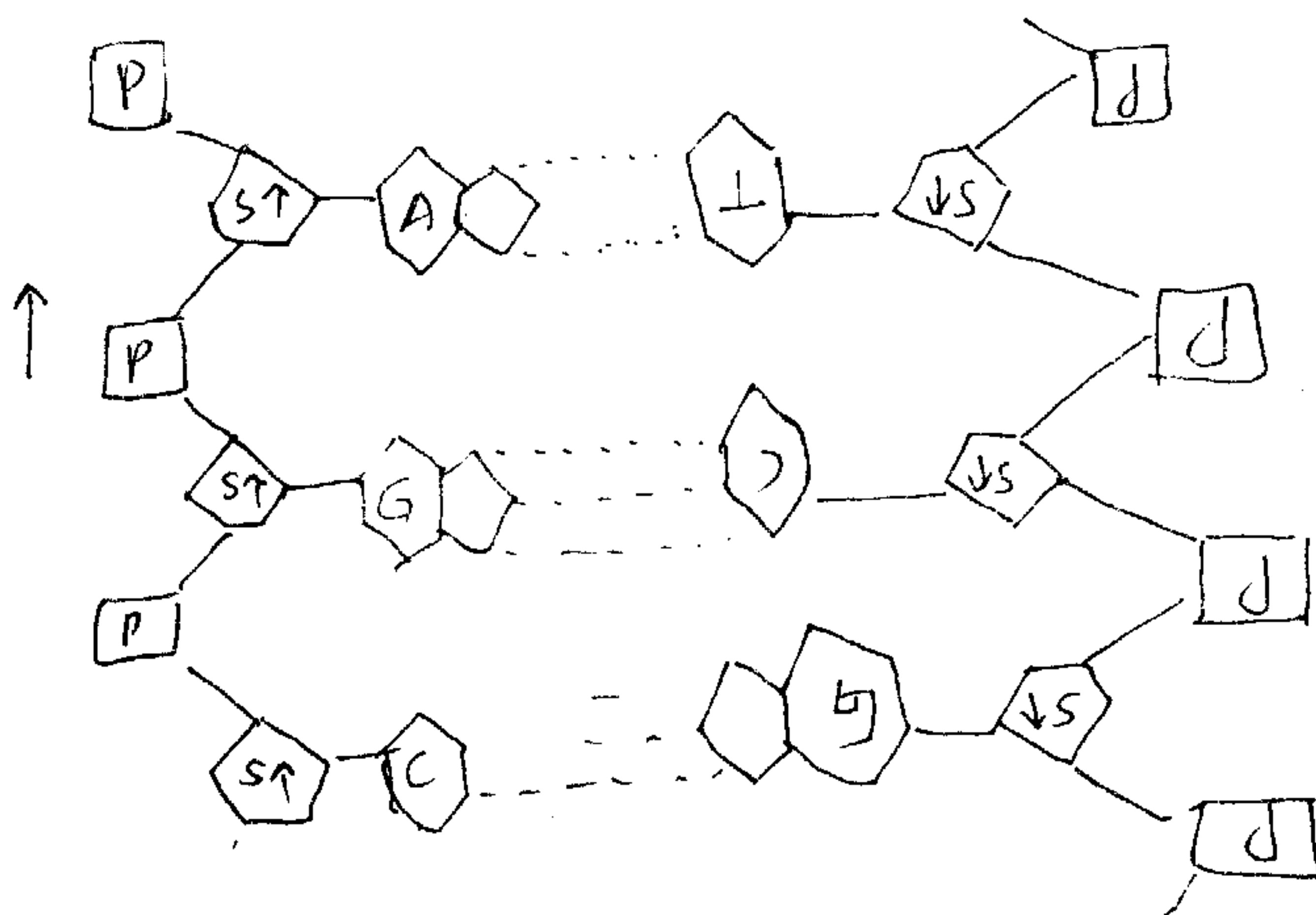
Step 6. Then paste chart # 6 of DNA structure and also show the Model of DNA structure, and show how (a). Phosphate and Deoxyribose sugar join together to form the back-born of DNA structure and (b). how nitrogenous bases unite together in a specific order through hydrogen bonds. as Adenine always unite with Thiamine through double hydrogen bonds, and Guanine always with Cytocine with triple hydrogen bonds; (c). also show how these nucleotides join together in long-chains and from a ladder-like structure in which hydrogen bonds seem as rungs or steps of that ladder.

(d). At this point also tell them that these two chains of DNA spiral around each other and make a spiral structure like a rope.

Step 7. Now provide each group the coloured cuttings of (i). Phosphate. (ii). Deoxyribose Sugar, (iii). Adenine Nitrogenous Base, (iv). Guanine Nitrogenous Base (v). Cytocine Nitrogenous Base and (vi). Thiamine Nitrogenous Base;

Step 8. And instruct them to form four types os Nucleotides, as has already demonstrated before them. by joining them together with the help of pieces of wire.

Super wise the work, help them and guide them and ask the group leader to present the work.

P
S
A
G
C

Step 9. Then after the completion of this. ask the participants to join these mucleotide together by connecting "A" with "T" and "G" with "C" by double and triple hydrogen bonds respectively. and by placing nucleotides in opposite direction. i.e different polarization: as has already shown to them in DNA Model and through. The chart of DNA structure (chart # 6).

Super wise the work. help and guide the groups and after completion ask the Group Leaders of each group to preset its Group work.

Step 10. After all these activities Summarise and elaborate the main idea with the help of chart # 1 and chart # 6. as.

" Chromosomes are made up of DNA (Deoxyribo-nuclleic Acid) (about 66%) proteins (about 27%) and RNA (Ribonucleic Acid (about 6 %)".

" Then indicating the chart of DNA (chart # 6) demonstrate/elicit that DNA is hereditary material. DNA'S structure was proposed by Watson and Crick on 1st March 1953. and for it they were awarded Nobel Price."

"DNA is a double helical structure. which is in a spiral shape (like a rope): and its basic structural unit is nucleotide. Nucleotides are of four kinds. viz "A" "G" "C" and "T". and these unite together to form a long chain. and two chains in opposite direction unite together with a definite arrangement as "A" always unite with "T" with double hydrogen bonds and "G" always with "C" triple hydrogen bonds.

Phosphoric Acid and Deoxyribose Sugar form the back bone of this structure of helix.

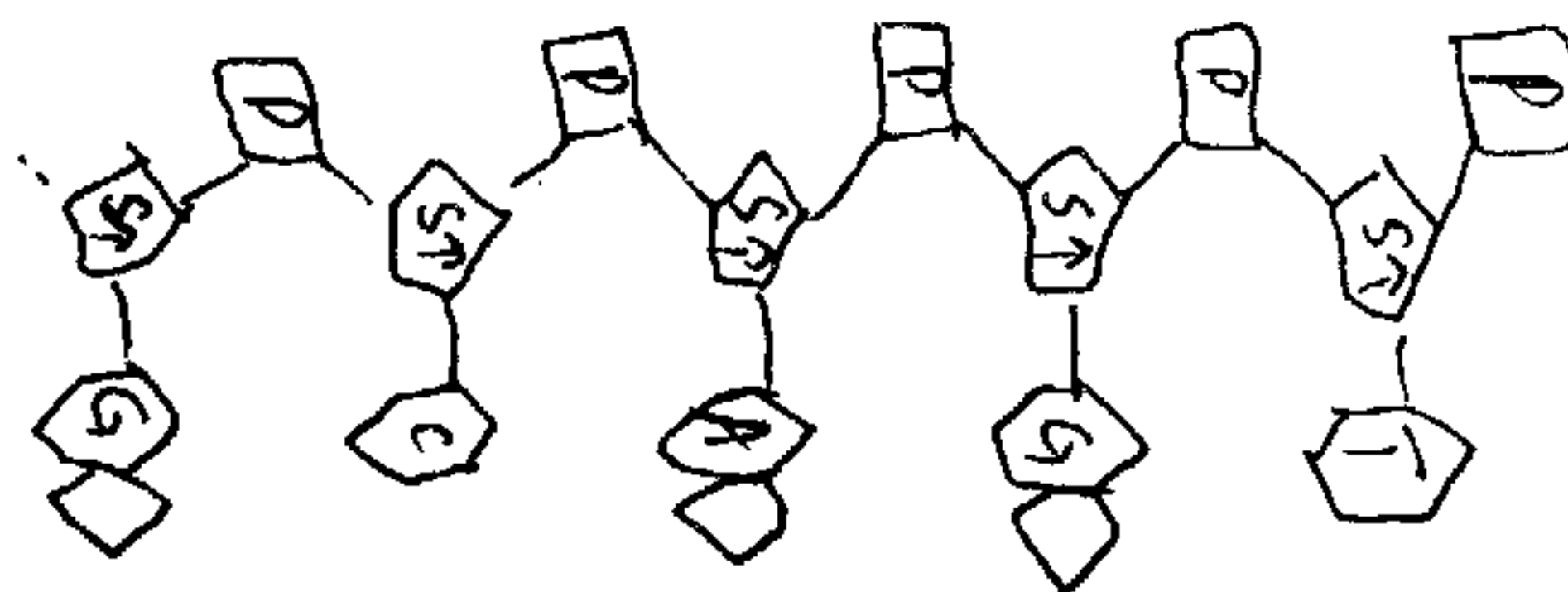
About 1000 to 1500 nucleotides form a "gene" which controls specific characters of individuals.

"Evaluation / Self Assessment"

Note: Make a chart of this and paste on board and ask the participant to note the Questions and solve it.

Q.1: DNA stands for ______________________________

Q.2: Nucletide is composed of ______________ and ______________ and ______________ .

Q.3: Please combine the following single chain of DNA with its complementary chain in right and natural direction and also showing appropriate hydrogen bonds:

Q.4: ____________ and ______________ forms the back bone of DNA strand.

Q.5: ____________ and ______________ proposed the structure of DNA and were awarded ____________ for this marvelous discovery.

Your score ______________

It only of your answer is not correct, then see for

Question No.1 page 177 of your text book

Q2. Page 180 of your Text book.

Q.3: Pages 181-182 of your text book.

Q.4 Page 181 of your text book.

Q.5: Page 181 of your text book.

1. **Subject** : **Biology**
2. **Class** : **F.Sc**
3. **Topic** : **Water Pollution**
4. **Objective** : **The student will be able to**

    i) Know The meaning and causes of water palliation.

    ii) Express the effects of water pollution on human health

    iii) Get Aware ness about the control of water pollution

4. **Material Needed:** Picture, Cutting of the news paper.

5. **Introduction :** Let us see the cutting of an urdu news paper about water pollution.

ذخیرہ آب کی ابتری

شہر کے اندر رہنے والے میونسپلٹی کے ملازمین کی غفلت کی بناء پر آلودہ اور مضر صحت پانی پینے پر مجبور ہیں۔ یہ بات بیان کی گئی ہے کہ وہ بڑے ذخیرہ آب کا ڈھکنا علیحدہ ہو کر رہ گیا ہے اور اب وہ ذخیرہ آب ہر قسم کی آلودگی کیلئے کھلا ہوا ہے۔

ملحقہ آبی ذخائر بھی بری حالت میں ہیں ان میں سڑے ہوئے پتے اور فجائی بھری ہوئی ہے کیونکہ ان کی کبھی صفائی نہیں کی گئی۔ میونسپل کمیٹی گھریلو صارفین کو فراہم کردہ پانی میں کلورین ملانے کی زحمت گوارہ نہیں کرتی۔ اس بات کا اندیشہ ہے کہ بروقت اقدام نہ کرنے کی صورت میں کوئی وبا بالخصوص پیٹ کی بیماریاں پھوٹ پڑ سکتی ہیں۔ مقامی، سماجی حلقوں نے صوبائی حکومت پر زور دیا ہے کہ وہ صحت عامہ کے مسائل کیلئے متعلقہ حکام کو ہدایت کرے۔

"ہمارے نامہ نگار"

'بہاول نگر'

12 نومبر 1997

As we see the above cutting of the news paper we come across that polluted water is the most fatal for human and are the other organisms life. About more then half people are using unhygienic water. About all the fatal diseases half of them are caused by water in Pakistan.

Dirty / polluted water causes disease by adding parasitic insects, round worm, flat worm and human faces.

This lesson is not only necessary for awareness about environment but also practicable to control various diseases, and preservation of water resources from germs, and water blooming of algae

6. ACTIVITY NO. 1 PAIR WORK

Time 10 Minutes

- Make pairs of the students.
- Ask them to note down the following questions from the board them.

i) What are the poison/harmful material being added to water from our surroundings?

ii) What are the effects of pollutants on the life of living organisms?

- Supervise and guide the students if they need.
- Conclude the two questions after discussion as under

- The harmful material being added to water from our surroundingars industrial waistes, pesticides, insecticides, house garbage, fungi, algae, round worms, flat worms, protoza.

- The pollutants cause various diseases in man and other organisms.

7. ACTIVITY NO. 2

GROUP WORK

TIME 10 MINUTE.

- Make appropriate groups.

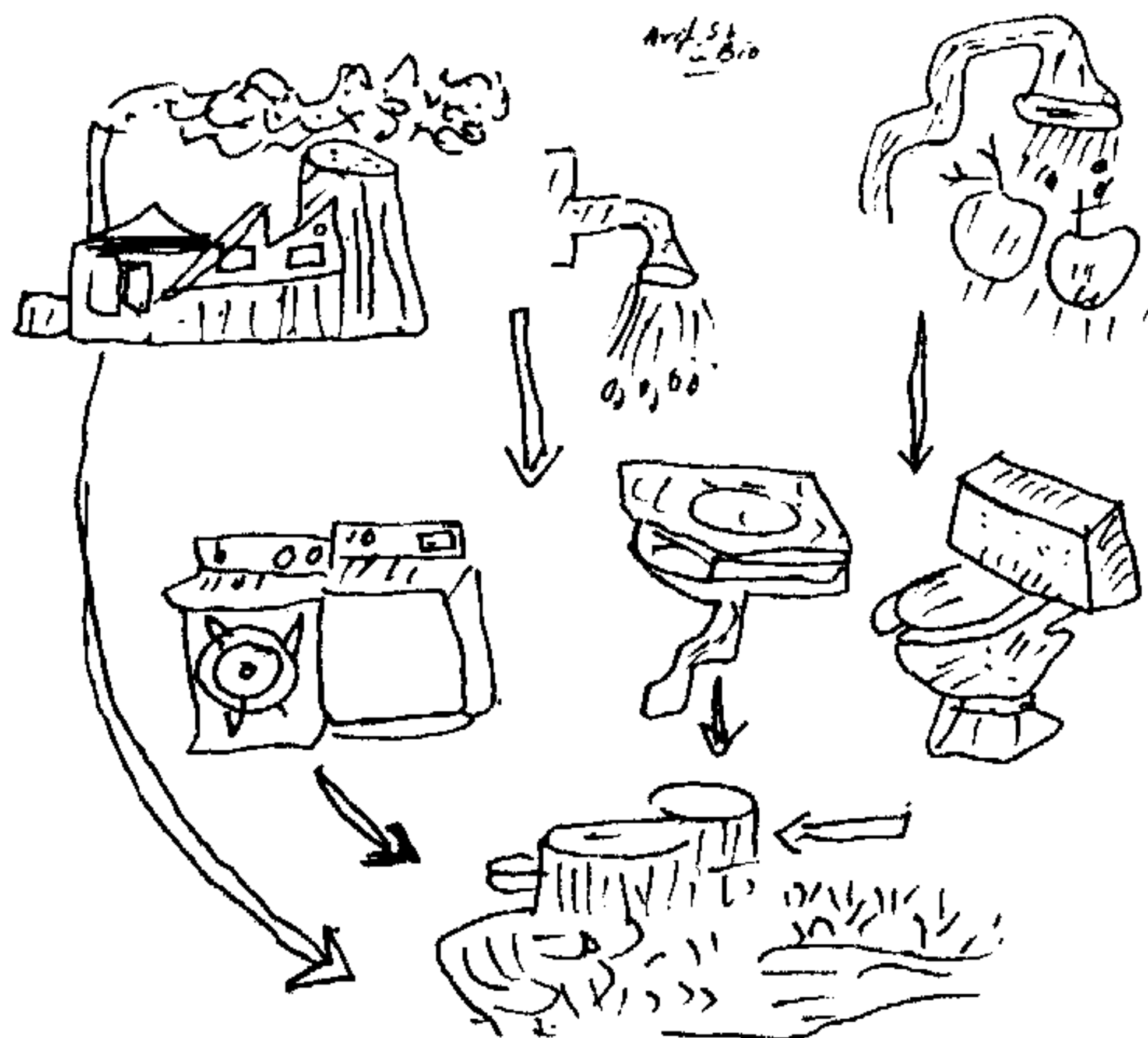
- Give a picture to each group.

- Ask each group to see the picture, discuss it in the light of following questions and give their answers.

  i) According to your opinion what is the greatest source of water pollution?

  ii) After seeing the picture also note down the similar water polluting sources in your locality?

- Facilitate the groups to understand the questions and also supervise them properly to make sure full participation of students.

- Conclude the whole discussion in two or three sentences.

ACTIVITY NO. 3

INDIVIDUL WORK
TIME 10 MINUTES

- Give the following statements to the students on a chart to fix on black board and ask the student to study the chart intensively and answer the following questions.

- Chart: water covers some 75% of earth surface and is also a components of soil and air. It is also major constituent of living organisms (animals & plants) comprising 70 to 90% of their body weight. Calculation by various scientists estimate that 97% of total water of planet earth is in ocean. 2% in the form of frozen ice cap and glacier and only 1% as available fresh water in lakes. Streams and rivers.

total domestic consumption of water is only 10% as compare to 90% used in irrigation and industries. an other traditional and major use of water is transportation of waste including industrial waste of cities.

wastes emptied into rivers were consumed by microorganisms and a few kilometers down stream of waste microorganisms could not decomposed and recycle them before the water reached the next city. industry also consumed vast quantities of water and much of it polluted with chemicals returned to river.

most of these water pollution problems can be overcome by monitoring of fresh water and preventing the discharge of toxic material in the water bodies.

Q.1 What is amount of water in living organisms by weight?

Q.2 How much percentage of water on the planet earth in is oceans?

Q.3 What is the percentage of water is in the form of lakes, streams, and rivers?

Q.4. What do you know by decomposition?

Q.5. How can we keep our rivers pollution free? Give your suggestions.

- Conclude after discussion about correct answers in the form of a Summary not more then five sentences in your own words.

EVALUATION

INDIVIDUAL WORK

TIME MINUTE.

Q.1 Define Pollution & Pollutant?

Q.2 Differentiate between fresh water & marine water in one Sentence?

Q.3 What are decomposers?

Q.4 Tell the names of any four organisms which cause water pollution?

Q.5. What is the importance of water for human life?

A.1. Any things, which make water. unfit for human health is called pollutant. And this addition of pollutants to water is called pollution.

A.2 Lakes, Streams, Rivers water is called fresh water, while oceans water is called marine water.

A.3 The organisms which breakup large molecules into smaller ones by their living activities are called decomposers.

A.4 Protoza. Fungus. Round worm. Flat worm etc.

A.5 Digestion. circulation. etc.

STORY FOR TEACHER DEVELOPMENT

The rocks.

A time management specialist was asked to give a presentation on her speciality. She decided to do a demonstration. First she asked her assistants to bring a big bucket and put it on the table in front of the audience. Then she asked for large, grapefruit sized rocks and filled the bucket with them.

"Is the bucket full," She asked/"

" Yes," said the crowd, but she asked for more to put in any way. This time her assistants brought in pebbles. She poured the pebbles in the bucket and it help a surprising number in the space between the big rocks.

" Now is the bucket full? "She asked.

"Yes," No" Yes," "No, " said various persons in the crowd. Some people were uncertain; some were getting suspicious. The time management specialist asked for more. This time the assistants brought her sand. She poured sand in the bucket and it filled the spaces between the pebbles.

"Now is the bucket full?" She asked.

"Now," they answered. By now, every one was suspicious. So she asked for water and poured in quite a lot. Now no one could think of anything else that could fit in that bucket.

"What does this process demonstrate?"

asked the time management specialist.

One member of the audience spoke up "No matter how busy you can always fit in one more thing".

I can see how you might think that was my point, but it is not "said the specialist. "I was trying to show you that if you don't put the big rocks in first, you, never get them in at all".

***Suggested them**: "Set you priorities; and do the most important thing first."*